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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/031,364	02/19/2002	Gary Lock	5626	6886

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EXAMINER	
DIAMOND, ALAN D	

ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 02/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/031,364	LOCK ET AL.	
	Examiner	Art Unit	
	Alan Diamond	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 November 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Comments

1. The proposed drawing corrections filed November 10, 2004 are approved by the Examiner. Corrected drawings are now required in reply to the instant Final Rejection to avoid abandonment of the application. The previous objection to the drawings will not be held in abeyance.

2. The objection to the specification for informalities has been overcome by Applicant's amendment thereof.

3. The objection to claim 22 for informalities has been overcome by Applicant's amendment of the claim.

4. The 35 USC 112, second paragraph, rejection of claim 1-15, 21, and 23-25 has been overcome by Applicant's amendment of the claims.

5. The 35 USC 103 rejection over Becker in view of Pethig et al is expressly withdrawn by the Examiner in order to avoid redundancy.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-6, 10, 11, 16, 17, 21, and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Becker et al, WO 97/27933.

Becker et al discloses a method for determining the properties of a particle, including its response to a chemical or physical agent, and for separating particles of

more than one type, comprising the steps of applying to a suspension of particles a first signal at a first frequency and at a plurality of different phases whereby the particles experience a traveling wave dielectrophoretic force of which there is a real part which is negative and of which there is also an imaginary part, and simultaneously applying a second signal at a second frequency whereby either the real part or the imaginary part of the traveling wave dielectrophoretic force on the particles at the first frequency is altered in magnitude (see p. 10, line 8 through p. 13, line 10; p. 22, line 19 through p. 23, line 2; p. 23, line 24 through p. 24, line 19; and claims 1, 16, 36-38; 42-44, 50-54, 56-58, 62, and 65-68). It is the Examiner's position that there inherently is a traveling wave dielectrophoretic window, as per instant claim 2. Becker et al also discloses an apparatus for the application of traveling wave dielectrophoresis comprising an electrode array on a substrate, first frequency signal operating means, frequency signal generating means, means for electrically summing the two signals from such means and applying the summed signal to the electrode array (see p. 10, line 8 through p. 13, line 10; p. 22, line 19 through p. 23, line 2; p. 23, line 24 through p. 24, line 19; and claims 1, 16, 36-38; 42-44, 50-54, 56-58, 62, and 65-68). Levitation of cells is performed, as per instant claim 3 (see p. 39, lines 8-16; and p. 44, lines 1-10). Becker et al teaches the separation of leukemia cells from human blood cells (see p. 37, line 24 through p. 38, line 11). Since Becker et al teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 1-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Becker et al, WO 97/27933.

Becker et al discloses a method for determining the properties of a particle, including its response to a chemical or physical agent, and for separating particles of more than one type, comprising the steps of applying to a suspension of particles a first signal at a first frequency and at a plurality of different phases whereby the particles experience a traveling wave dielectrophoretic force of which there is a real part which is negative and of which there is also an imaginary part, and simultaneously applying a second signal at a second frequency whereby either the real part or the imaginary part of the traveling wave dielectrophoretic force on the particles at the first frequency is altered in magnitude (see p. 10, line 8 through p. 13, line 10; p. 22, line 19 through p. 23, line 2; p. 23, line 24 through p. 24, line 19; and claims 1, 16, 36-38; 42-44, 50-54, 56-58, 62, and 65-68). It is the Examiner's position that there inherently is a traveling wave dielectrophoretic window, as per instant claim 2. Becker et al also discloses an apparatus for the application of traveling wave dielectrophoresis comprising an electrode array on a substrate, first frequency signal operating means, frequency signal generating means, means for electrically summing the two signals from such means and applying the summed signal to the electrode array (see p. 10, line 8 through p. 13,

line 10; p. 22, line 19 through p. 23, line 2; p. 23, line 24 through p. 24, line 19; and claims 1, 16, 36-38; 42-44, 50-54, 56-58, 62, and 65-68). Levitation of cells is performed, as per instant claim 3 (see p. 39, lines 8-16; and p. 44, lines 1-10). Becker et al teaches the separation of leukemia cells from human blood cells (see p. 37, line 24 through p. 38, line 11). The application of the two frequency signals results in a time and horizontal displacement of matter (see p. 12, lines 3-15). The signals range from 10 kHz to 10 MHz (p. 13, lines 1-2). The use of a third signal would have been within the skill of an artisan. Becker et al teaches the limitations of the instant claims other than the differences which are discussed below.

Becker et al does not specifically teach varying the speed of the particles. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have varied the speed of the particles so that the particles could be separated.

Becker et al does not specifically teach a first signal of 55 kHz for TWD and a second static DEP signal at a frequency of 55 kHz, whereby the TWD window extends between 10 kHz and 18 MHz. However, as noted above, Becker et al teaches signals that range from 10 kHz to 10 MHz. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a first signal of 55 kHz for TWD and a second static DEP signal at a frequency of 55 kHz, whereby the TWD window extends between 10 kHz and 18 MHz, because such is within the scope of Becker et al's disclosure.

With respect to claim 25, Becker et al does not specifically teach that the substrate for the electrode array is transparent; illumination means to illuminate the substrate; and viewing means to view any particles on the substrate. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided for such features so that the particles could be viewed.

Response to Arguments

10. Applicant's arguments filed November 10, 2004 have been fully considered but they are not persuasive.

Applicant argues that the claimed invention is directed to a method for separating particles in a stationary fluid; in the preferred operation the fluid is stationary in the chamber during the process of particle separation; and that in the preferred operation, separation of different particles involves different particles traveling in opposite direction to each other. Applicant argues that this is contrasted with Becker et al whose method depends "totally on establishing a well-defined fluid profile above the electrodes"; and that all particles travel along the chamber in the same direction determined solely by the direction of fluid flow. However, this argument is not deemed to be persuasive because Applicant is arguing a limitation that is not in the claims. The claims are silent concerning a stationary fluid. Indeed, the instant specification clearly teaches that there can be hydrodynamic fluid movement (see page 14, lines 8-14, of the instant specification).

Applicant argues that Becker et al does not teach the method described in the paper by Pethig et al ("Enhancing Traveling-Wave Dielectrophoresis With Signal

Superposition," IEEE Eng. Med. Biol. Mag., Vol. 22, part 6, pages 43-50, 2003) cited by Applicant at page 13, lines 9-11, of the Remarks filed November 10, 2004, which paper "represents the subject matter of the captioned application". The Examiner hereby makes this paper of record. Applicant's argument is not deemed to be persuasive because the Examiner maintains that Becker et al anticipates or renders obvious the subject matter of the instant claims, as is set forth above and on pages 4-7 of the Office action mailed May 11, 2004.

Applicant argues that adding an extra signal to the electrodes in Becker et al is not straightforward; and "therefore, unobvious in view of the lack of teaching or suggestion, is knowing or determining what the frequency and magnitude of this third signal should be in order to change the dielectrophoretic movement of a specific particle type in a stationary fluid." However, this argument is not deemed to be persuasive because Becker et al teaches that "[d]ifferent electrical signals (frequency, magnitude, and phase, or a combination thereof) may be applied to the facing electrodes 5 from the signal generator so that particles experience different cDEP and/or twDEP forces" (see page 35, lines 16-18). The use of a third signal is clearly within the scope of Becker et al's disclosure.

Applicant points that the Examiner's statement that:

"However, as noted above, Becker et al teaches signals that range from 10 kHz to 10 MHz. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a first signal of 55 kHz for TWD and a second static DEP signal at a frequency of 55 kHz, whereby the TWD window extends between 10 kHz and 18 MHz, because such is within the scope of Becker et al's disclosure."

Applicant argues that in this statement, the Examiner is confusing the concept of a TWD signal and a TWD window. Applicant argues that the instant invention is directed to teaching how the TWD window can be changed so as to include (or exclude) any desired frequency; and that Applicant's claimed invention provides for superimposing two or more different voltage signals to electrodes to produce particle separation in stationary fluids, and that Becker et al does not teach this. However, this argument is not deemed to be persuasive because the Examiner has not confused the concept of a TWD signal and a TWD window. Said statement clearly states that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a first signal of 55 kHz for TWD and a second static DEP signal at a frequency of 55 kHz, whereby the TWD window extends between 10 kHz and 18 MHz, because such is within the scope of Becker et al's disclosure." Nothing unexpected with respect to Becker et al has been demonstrated with respect to signal frequency of the TWD window, or with respect to any voltage signal (it should be noted that the word "voltage" is never even mentioned in any of the instant claims). Furthermore, as noted above, the instant claims are silent concerning a stationary fluid.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Diamond whose telephone number is 571-272-1338. The examiner can normally be reached on Monday through Friday, 5:30 a.m. to 2:00 p.m. ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alan Diamond
Primary Examiner
Art Unit 1753

Alan Diamond
February 1, 2005